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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

January 1, 1938

Power Marches On

See Page 6

A SCIENCE SERVICE PUBLICATION

Do You Know?

Colds cause over half of the absences of employes from work.

The world's earliest, most primitive birds, that lived 150 million years ago, could not fly.

Workmen excavating in the London subway have found a fossil crab over 50 million years old.

Oil wells in the United States have been drilled as deep as two miles, but engineers say they could go a mile deeper, with present equipment.

The art of polishing granite was known in ancient Egypt, and a Scotsman in 1820 rediscovered a practical method for monumental work.

In an earthquake on the Northwest coast, last year, some tombstones in cemeteries were turned clockwise, but a few nearby were rotated in the opposite direction.

Colored life preservers are being urged to replace the drab ones in ordinary use, because an orange disk, for example, could be seen much farther off than gray or white.

In the White Mountains of New Hampshire, trails over forest and mountain are marked by signs placed so high the snow cannot cover them, and on distinctive standards, so that hikers can detect a sign even if it is crusted with ice.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

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There was trade between North and South America in Indian days, for articles made in Peru have been found in Mexico.

An ancient Chinese walled city is to be reproduced at a cost of over a million dollars for San Francisco's 1939 world's fair.

The land around London was 60 to 70 feet higher in the late Stone Age than it is now, and it is sinking at a rate of nine inches a century.

In Argentina, all medicinal products for children up to six years old must be approved by the Department of Hygiene, and all advertising, as well.

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PHILOSOPHY

Evolution Extended to Include Intelligence as Prime Factor

DARWINIAN evolution was extended to include the action of human intelligence, and science was called upon to cooperate with education and religion to apply ethics to the solution of the world's current problems, in the retiring presidential address before the American Association for the Advancement of Science delivered by Dr. Edwin Grant Conklin, professor emeritus of biology at Princeton, executive officer of the American Philosophical Society, and president of Science Service.

Terming "dull and fruitless" attempts to make science the handmaiden of religion, Dr. Conklin emphasized that science was vitally concerned with ethics, the religion of science."

Like Religious Teachings

The words expressing the ethics of the great scientists, among them Pavlov, Pasteur, and Tyndall, were shown by Dr. Conklin to contain ideals of conduct and character similar to those taught by great religious leaders. Often the substitution of the word "Truth" for "God" will bring them into agreement.

Militarists and dictators have no right to seize upon Darwin's principle of natural selection as justification of their philosophy that might makes right, Dr. Conklin warned.

"Darwin himself repudiated this extension of his principle to the struggle between races and nations of men," Dr. Conklin said. "Those who attempt to extend it into the field of intellectual, social and moral qualities should remember that the standards of fitness are wholly different in these fields. Physically the fittest is the most viable and most capable of leaving offspring; intellectually the fittest is the most rational; socially the fittest is the most ethical. To attempt to measure intellectual or social fitness by standards of physical fitness is hopelessly to confuse the whole question, for human evolution has progressed in these three distinct paths. Man owes his unique position in nature to this threefold evolution, and although the factors of physical, intellectual and social progress are always balanced one against another, they are not mutually exclusive."

Intelligence has become a prime factor in evolution. Human selection, as practiced either by the hit or miss process of "trial and error" or the vastly more rapid and less wasteful method of remembered experience, is just as natural as the "natural" variety to which Darwin devoted most attention. We are continually improving on nature, as shown in agriculture, industry, medicine and education.

Dr. Conklin, urging this naturalness of intelligence, also upheld "free will," the freedom to choose between alternatives that are offered, without which there can be no responsibility, no duty, no ethics. But he emphasized that the will is not undetermined, uncaused, absolutely free, but is the result of the organization and experience of the organism, and in turn is a factor in determining behavior.

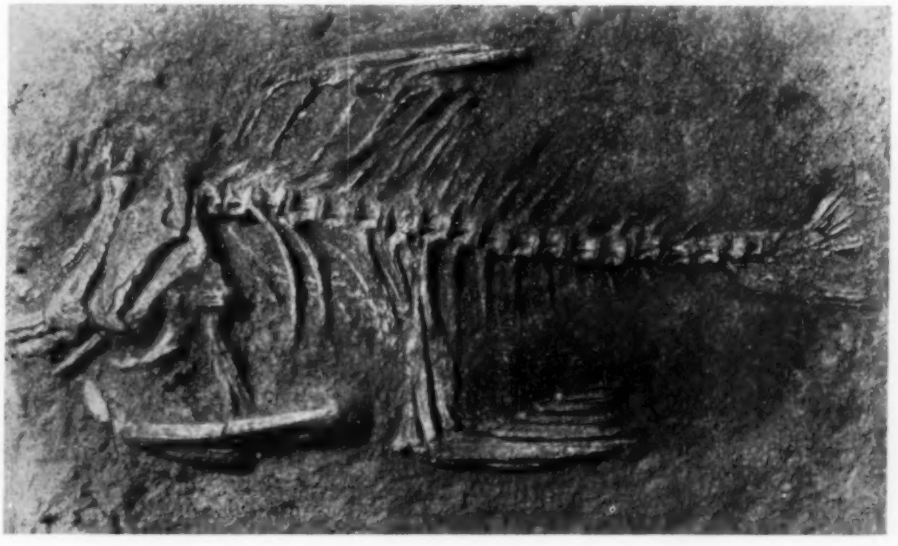
Biologists do not have to go within the atom and espouse Heisenberg's principle of indeterminacy to explain free will. "The fact that man can control to a certain extent his own acts as well as phenomena outside himself requires neither a little daemon in the electron nor a big one in man."

Admitting that neither in human nature nor in social relations has progress kept pace with science, Dr. Conklin declared this the fault of man and society rather than science. Human nature lags behind scientific progress. How to remedy this? Dr. Conklin discards heredity and eugenics as too slow a process. Education, he concludes, based on a knowledge of the principles of development and aimed at the cultivation of better relations among all classes, races and nations, is the chief hope of social progress.

To the recent attack by Dr. Robert Maynard Hutchins, University of Chicago president, that science is a failure in the educational process, Dr. Conklin replied:

"Those who have never experienced the discipline and ennobling effects of scientific studies fear that science will destroy our civilization and are calling upon educators to repent and to return to the good old subjects of classical learning. It was not science that caused the decay of former civilizations, nor was it in the power of classic art, literature and philosophy to save those civilizations. Certainly there are no other studies than science that distinguish so sharply truth from error, evidence from opinion, reason from emotion; none that teach a greater reverence for truth or inspire more laborious and persistent search for it. Great is philosophy, for it is an attempt at a synthesis of all knowledge, but if it is true philosophy it must be built upon science which is tested knowledge."

All who believe freedom and responsibility are essential to all progress were called upon by Dr. Conklin to use their



15,000,000 YEARS OLD

During amber mining operations in East Prussia, a seabass skeleton was found in a layer of earth which geologists estimate to be 15,000,000 years old. It was discovered in the "green wall" above the "blue earth" of the Palmnicken Amber Mines.

utmost influence to see that intellectual freedom shall not perish from the earth. Science, he said, should stand for freedom especially in those countries where force, war and unutterable ferocity are used to compel acceptance of political, social or scientific creeds.

"In its practical aspects," said Dr. Conklin, "the ethics of science includes everything that concerns human welfare and social relations; it includes eugenics and all possible means of improving human heredity through the discovery and application of the principles of genetics; it is concerned with the best means of attaining and maintaining an optimum population; it includes all those agencies such as experimental biology and medicine, endocrinology, nutrition and child study, which promise to improve bodies and minds. It includes the many scientific aspects of economics, politics and government; it is concerned especially with education of a kind that establishes habits of rational thinking, generous feeling and courageous doing."

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BIOLOGY

Tomato Roots Without a Plant Develop Tremendous Pressures

PRESSURE enough to send sap to the top of a California Big Tree, equivalent to more than 100 pounds per square inch, was developed in humble tomato roots. And the roots had never been attached to tomato plants.

Genuinely sensational experiments, which overturn one of the most widely accepted theories in the whole field of plant science, were reported by Dr. Philip R. White of the Rockefeller Institute for Medical Research, at the meeting of the American Association for the Advancement of Science in Indianapolis. The research was conducted in the Institute's laboratories at Princeton, N. J.

Root Tissue Cultures

Some time ago, Dr. White discovered how to keep roots growing after they had been detached from the parent plant, somewhat after the manner of the famous chick-heart tissue cultures kept going for many years by Dr. Alexis Carrell. He used tomato roots.

He noticed, as his "orphan" roots continued to grow in their culture fluid, that they contained the same kind of sap-conducting vessels possessed by normal roots, though there was apparently no work for them to do.

It occurred to him that here was a chance to test out one of the most disputed points in botany, the old theory of root pressure. Once favored, this theory had been abandoned during the past sixty years in favor of the idea that the sap was pulled upward through the plant by suction from the leaves, where evaporation was going on.

The earliest root-pressure experiments, performed by Stephen Hales early in the eighteenth century, showed pressures of only 1.4 atmospheres. Nobody had ever been able to equal that record since. And this pressure was nowhere nearly enough to account for the rise of sap in tall trees and long vines. So after a time the theory was given up.

But Dr. White had roots that had never supplied sap to any stem. With these he decided to make a new and critical test.

He attached them strongly to narrow tubes in which the sap pressure could be balanced against the pressure of a column of mercury. With no apparent difficulty at all, the roots balanced 90, then 100, then 125 pounds per square inch of pressure. The apparatus failed at the higher pressures, but the roots seemed to be quite ready to go on to still higher figures.

Dr. White stated that he is now redesigning his apparatus, to give his tomato roots a chance to show what they really can do.

He offered no explanation of the great root pressures he has been able to demonstrate. He added, however, that he and his colleagues are making a start, at least, at trying to find out.

Life In Extreme Cold

Life can survive at the almost unimaginably low temperature of liquid air, Dr. Basile J. Luyet of St. Louis University told a zoological group at the meeting.

Some experiments have succeeded in the past, using bacterial spores and other low life forms with very low water content. However, Dr. Luyet has been able to obtain survival of living cells of normal "juiciness," and has further experiments now in progress.

Possibility of bringing ordinary cells alive through the intense freezing experience apparently depends, he said, on absence of actual ice crystals in them.

X-Ray "Candling"

Oranges, apples, potatoes, other fruits and vegetables can be "candled" like eggs, through the application of X-rays, Dr. R. B. Harvey of Minnesota University Farm, St. Paul, reported. X-ray shadows cast on the screen of a fluoroscope show clearly when the fair exterior of fruit or vegetable conceals a serious inner fault.

Application of the method in the fruit-packing industry has already been started. In the Florida citrus fruit belt, operators watching the X-ray shadows of fruit carried past them on a conveyor have been able to sort from 75 to 150 boxes an hour, eliminating internally imperfect specimens that would otherwise have gone into the market.

Worms' Eggs Are Tough

If the eggs of Ascaris, a common parasitic worm, were transported to a planet nearly a million times larger than the earth, they would remain alive in spite of the crushing pull of gravity. This is indicated by the results of experiments performed at the State University of Iowa by Dr. H. W. Beams.

Among the various kinds of cells he whirled in an ultra-centrifuge until they were subjected to forces thousands of times that of gravity were some of these eggs. Subjection to a force 150,000 times gravity for ten days did not kill them, and they lived through half an hour of whirling at 800,000 times gravity.

The research is being conducted with the aim of finding out more about the physical properties of protoplasm.

Connecticut's "Sand Bowl"

Wind erosion is no monopoly of the West's "dust bowl." In pre-Revolutionary times, the staid Eastern colony of Connecticut had a "sand bowl," Dr. Charles E. Olmstead of the University of Chicago reported.

It was caused by the same cycle of events that set up the present "dust bowl" of the West, he stated. A sandy region in central Connecticut was cultivated not wisely but too well, then abandoned. Wind erosion set in, aggravating the mischief.

During the generations since then, natural vegetation has healed the ancient scars. But it is not the plant society that once lived there. Even yet, said Dr. Olm-

stead, it constitutes a "secondary" stage: a community of lower order than the original terrain supported.

Fighting malaria by timing mosquito-control activities with peaks in the malaria mosquito's breeding schedule was suggested by Dr. E. Harold Hinman of the Tennessee Valley Authority. These peaks, marking the time when broods or crops of mosquito larvae are produced, seem to come at about ten-day intervals in the region Dr. Hinman studied. Climate and other factors may change the schedule in other regions. If the larvae are produced at regular intervals, however, Dr. Hinman believes that larva-destroying measures should be timed to fit the peaks of larva production.

Buckwheat may be a serious enemy of pine trees, through harboring a fungus that causes a serious root rot, E. J. Eliason of the New York State Conservation Department stated. In a New York tree nursery, young trees sickened and died on land where buckwheat had been grown as a cover crop. Even four years after the last planting of buckwheat, the fungus was still in the soil. virulently ready to attack pine roots.

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PERILOUS TREASURE

Getting these sorcerers' masks out of their ancient tribal home territory was rather risky: it is "verboten" for strangers to possess them.

ETHNOLOGY

Mystic Rites of West Africa Revealed to Harvard Scientist

Men and Women Have Secret Societies for Teaching Youths and Girls During Long Seclusion in "Bush"

MYSTIC religious rites of West African savages, with their emphasis on spirit worship and human sacrifice, many of them kept secret for many centuries by a merciless death penalty for their revelation, have been pieced together by a Harvard scientist.

According to Dr. George W. Harley of Harvard's Peabody Museum, who has just returned from 12 years in the bush, more than 2,000,000 natives of Liberia, Sierre Leone and French Ivory Coast, virtually the entire population of the area, were members of the Poro, a secret religious society fostering these strange rites, at the height of its power only a generation ago.

Today, due to the government's vigorous efforts to modify it, the Poro is only half its one-time size and its more barbarous practices have been stamped out. While the Poro is best known in Liberia, it represents the culmination of many similar societies which once spread across the continent.

300 Ceremonial Masks

Dr. Harley has brought back more than 300 wooden ceremonial masks used by the Poro, the most complete collection of its type ever assembled, as well as numerous other sacred relics.

How sacredly these are held by the natives is shown by the fact that a simple stone axe he has obtained was so revered that it could never be bought or sold. Instead, through the centuries of its existence, it was handed down from one high priest to another with the transference traditionally solemnized by the sacrifice of the recipient's eldest son.

"This is not all cruelty and savage blood-thirstiness," Dr. Harley explains. "It's just that the people take their religion so seriously they hold human life cheap rather than neglect its demands."

In addition to its religious significance, the Poro was very powerful politically, so powerful indeed that officials of the society have been known to stop bitter tribal wars merely by walking between the fighters. The Poro also served, and still does, to a large extent, as a tribal educational institution.

Boy candidates for the society were taken into the bush by their elders for a rigorous educational program. First the boys went through a ceremony symbolizing their death; theoretically they were swallowed by an enormous sacred crocodile. Relatives and friends not members of the society, including all the women of the tribe, were told the boys were dead. This pretense was kept up for from three to seven years while they were isolated deep in the sacred forest, learning trades, tribal traditions, history and culture and the secret sign language of the society.

Living in Spirit World

During this period the boys were supposed to be living in an invisible spirit world and no one was allowed to see them on pain of death. Even those who might accidentally stumble on the Poro meeting place were killed and then eaten so that no human traces would be left in the supposedly spirit world. Even those members of the Poro who died accidentally in the bush were eaten in sacred ritual feasts.

Concerning these rituals the initiates swear to secrecy on the mask of the great "devil," the big man of the Poro. They hear his voice but do not see his face unmasked until the day of graduation, a grand occasion. At this graduation the boys are supposedly reborn from the belly of the great crocodile and they return to their village with great celebration.

They are entirely new beings now—men instead of boys—and they do not recognize any of their old friends or any past events. Indeed they must be introduced as strangers to their own mothers.

The masks, an integral part of the Poro, are worn in conjunction with flowing robes and "hula" skirts which completely cover the body. Lest his voice be recognized, the wearer speaks with a throaty, rolling falsetto. Thus mask and voice effectively conceal his identity, as well as serving as a badge of office. The

masks are worn at all ceremonial functions and serve to carry out the belief that the wearer is not a man but a spirit from the jungle.

The masks are of various types, all of them beautifully carved by special tribal artists. Many of them are portraits, occasionally of an important ancestor; others are caricatures. They vary in size, some being small replicas "for the spirit to rest on when he's tired." Some are tiny portraits of the owner, serving both as a sort of fraternity badge and as an object of personal worship. All are plain black except those worn by high officials which may have white stripes or red lips, red being the sacred Poro color.

The women of the tribes, excluded from the Poro, have a parallel society, the Sande, which functions in a somewhat similar manner and gives the girls instruction in the household arts and medical remedies, as well as a thorough training in poisons and their uses. Thus, while religion is for men only, the women actually have a much higher standing than in other primitive societies by this threat of poisoning.

Another mark of woman's relatively high position is a very carefully guarded Poro secret. The consort of the big man of the Poro is head of the Sande and attends Poro meetings. Only these two are members of both, a fact known only to high officials.

Dr. Harley has also obtained valuable records of black magic societies, leopard and snake societies, and some of their sacred relics and other examples of primitive African arts.

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ENGINEERING

Industry's Giants Are Industry's Children

See Front Cover

DESTINED perhaps to be the driving power behind great industrial plants, these beginnings of giant electrical machines are themselves industry's offspring—giants on the way to birth. Here they are growing in the assembly aisle in the Westinghouse factory. Presently they will be the servants of men; now men are serving them.

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Beavers were once plentiful around Sante Fe, N. M., and they are now being re-introduced there in a state park.

Only one-seventh of Japan is fit for farming.

BIOLOGY—MEDICINE

Individuals Changing Sex Neither Man Nor Woman

Intersexes Not Rare, and Biologically Important; Prolactin Has Outstanding Role in Growth of Intestine

WHEN a woman turns into a man, and thereby becomes front-page news, it is pretty safe to assume that she never was entirely a woman.

More probably she was an "intersex" —a being neither female nor male, but in process of transition from the one to the other from the earliest pre-birth stage of development onward.

The denouement, when "she" is declared legally a "he", is only the last step in a long process.

Intersexes are by no means rare throughout the whole animal kingdom, declared Dr. Richard Goldschmidt of the University of California to the American Association for the Advancement of Science. They are found in all gradations between completely male and completely female. Dr. Goldschmidt confined his discussion mostly to examples taken from among the insects.

An intersex individual begins development normally enough, as either all male or all female. But there comes a physiological turning point, where biochemical or genetic forces tending toward opposite sexuality begin to operate. The later-developing sex organs may then become those of the individual's natural opposite.

Two types of influence may give rise to intersex development. Hereditary influences, resident in or on the chromosomes within the cells, may start and carry through the process; or female may be turned into male (or vice versa) by the natural or artificial injection of opposite-sex hormone or gland secretion.

Milk-Hormone

Prolactin, the gland secretion or hormone that causes the flow of milk in mother animals, also causes growth of an important part of the digestive tract, it was demonstrated in experiments reported by Drs. J. P. Schooley, Oscar Riddle and R. W. Bates of the department of genetics of the Carnegie Institution of Washington, with laboratories at Cold Spring Harbor, N. Y.

Prolactin is one of the products of the pituitary, a ductless gland situated in the head, near the brain. The three investigators surgically removed the pituitaries from 149 pigeons. They then administered pituitary extracts to part of them, leaving the rest untreated.

The birds given the pituitary extracts lived and grew in a way much more nearly normal than did the untreated pigeons. The latter showed marked loss in length of the small intestine, as well as in its food-absorbing inner surface. As might have been expected, the pituitary-less pigeons showed serious loss in weight.

Better appetite was evident in the operated pigeons receiving supplementary pituitary extract. They ate two or three times as much as did the pigeons not receiving the extract.

The critical test came when one group of operated birds was given prolactin, and a comparison group received pituitary extract from which all prolactin had been removed but which still presumably contained all its other elements. The prolactin group throve well; the extract-minus-prolactin group did no better than would have been the case had they received no treatment at all.

Syphilis Damage

Over one-fourth of all children born with syphilis have involvement of the nervous system—brain, spinal cord or nerves or all three, Dr. Charles C. Dennie of the University of Kansas Medical School reported. He studied some 1,200 cases of congenital syphilis, that is, cases in which the disease was implanted in the brain and spinal cord at birth or sometime during childhood or adolescence.

Many of these children are in institutions for the feebleminded. Dr. Dennie described them as "simply motivated lumps of flesh without conscious volition of their own." Their degree of mental deficiency shades upward from idiocy to dull wittedness. For the ones who have paresis or softening of the brain, there is no hope. Even with the most modern forms of treatment, only a few of them improve. Most of them gradually degenerate into a state of imbecility, followed by death.

In some cases of nerve syphilis the power of locomotion is affected. The condition is often wrongly diagnosed as birth injury or as infantile paralysis. A certain type of paralysis seen in these cases can be corrected by medical treatment without any operation.

Any child with paralysis of arm, leg or side should have a thorough examination by a physician, Dr. Dennie emphasized, because a large number of them do have syphilis.

The germ of syphilis may exist in a form that is intrinsically able to withstand the chemicals used to treat the disease and which are successful in curing it in the majority of cases, Dr. Herman Beerman of the University of Pennsylvania School of Medicine suggested. Existence of such strains of the germ, he pointed out, would explain the occasional failure of modern drugs in treatment of the disease.

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ZOOLOGY

Arctic Canada Looks for An Improved 'Husky' Dog

CANADIANS in the frozen region beyond the northernmost railroad are watching eagerly as dog breeders, amateur and professional, work hard to develop a strain of sled dog to replace the famous pure-bred Eskimo husky dog.

For the husky, hero in countless stories of fact and fiction and still the main means of transport in a frigid region only occasionally reached by boat and 'plane, is now disappearing as a result of indiscriminate cross-breeding by the white man.

In some parts of the Arctic, J. Dewey Soper, Canadian scientist and investigator, reveals in a report on Eskimo dogs issued by Canada's Department of Mines and Resources, "pure-blooded Eskimo dogs are now very rare. This is due to the fact that the white man, especially in recent years, has given considerable attention to increasing the size and strength of native dogs for draught purposes by cross-breeding with other types.

Breeding Often Indiscriminate

"This breeding has often been carried on in a rather indiscriminate way and although in some instances a faster or heavier type of dog has been developed, it is highly problematical if, for general purposes under Arctic conditions, any improvement has been achieved."

The dogs which today ply the trap trails in the wooded regions and the dogs which pull sleds over Arctic wastes for missionaries and police are a mixed lot, in every color from the grayish-white of the pure-bred husky, through blacks and browns, yellows and spotted varieties, telling the story of mixture with Russian wolf-hounds, wolves, big Newfoundlanders, mongrels, collies and even German police dogs.

Their varied appearance, as well as the increasing rarity of the pure-bred husky, which is quite rare in some parts of Arctic Canada, reveal the fact that each breeder has had something else in view to add speed, strength or size to his sled dogs.

Pure-Breds in North

The purest bred dogs receive the best care and are found at the farthest north police, mission and fur posts, hundreds of miles above the Arctic Circle, where planes do not yet reach and where boats come only once a year. For here they are almost the only means of transportation.

Growing rapidly from birth and weighing 50 pounds when a year old, the husky weighs 100 pounds and can pull its own weight in sled and supplies when it is fully grown. In the winter it is fed two or three pounds of walrus or seal meat at nightfall. Dogs belonging to Eskimos are fed principally walrus meat, for the Eskimo himself is fond of seal. In the summer the team is left to itself to forage seafood cast up on the shore.

Must Guard Caches

When food is low the husky, which can travel as much as a thousand miles on a journey and can go for long periods of time without food, will eat almost anything. Then harness, sled ropes, clothing, kayaks have to be kept away from the dogs, for they will devour anything made of seal or walrus skin.

Food caches have to be guarded by especially large boulders, too big for the 100-pound dogs to move. But no matter how hungry, it is a fact that the husky will not touch wolf flesh, though they will eat each other.

Experiments in breeding are going on continually. The Royal Canadian Mounted Police have carried out experimental breeding at their headquarters in Ottawa with Borzoi dogs and at northern posts with other breeds. The Hudson Bay Company, giant fur trading organization, and other fur establishments, have carried out breeding tests with all types of large dogs.

Huskies breed all year; a litter can be expected at any sea- (*Turn to page 11*)

MIXED

A team of six mixed Eskimo husky dogs hauls a sled across the Great Bear Lake in western Canada. On dogs like these trappers, the "Mounties" and others depend for winter transportation.

ASTRONOMY

Sees Sun Rise At Same Hour For Four Months

SUPERINTENDENT Preston P. Patraw of Zion National Park has had the unique experience of seeing the sun rise at almost exactly the same time every day for four months.

From April 20 to September 1, Mr. Patraw reports, the sun's rays stream first into Zion Canyon within a few minutes of 7 o'clock in the morning. The unusual phenomenon is explained by the park superintendent as follows:

About April 20 the sun rises at 7:01 A. M. at the base of East Temple, one of the huge formations making up the canyon wall. On June 21, it rises at 7:05 A. M. at the top of the Temple, and by the first of September it again rises at the base of the formation at 7 o'clock. During the intervening time, the slope of East Temple is such that each day the sun's rays must be a little higher on the horizon before they can reach past the great rock hulk. Since the sun rises earlier each day, it would reach the slightly higher point on the Temple at approximately the same time.

Science News Letter, January 1, 1938

PHYSICS

New "X" Particle Should Have No Fixed Mass

SCIENCE may be on the threshhold of discovering a whole host of particles intermediate in mass between the electron and the proton nucleus of the hydrogen atom. This is the implication in the report of Prof. G. E. M. Jauncey, of Washington University, St. Louis, Mo. (*Physical Review*).

Under the title "Possible Origin of the X Particle," Prof. Jauncey describes a new theory which accounts for the new-found particle first discovered at California Institute of Technology by Drs. Carl Anderson and Seth Neddermeyer and confirmed by the Harvard scientists, Drs. J. C. Street and E. C. Stevenson.

Drs. Street and Stevenson found that the mass of the X particle was about 130 times that of the electron. But, says Prof. Jauncey, there is no special reason why the particle should have this particular mass. Other investigators, in fact, have determined that the particle may have a mass of 700 times that of an electron.

Prof. Jauncey's theory indicates that the X particle may well be formed in the intricate process of collision occurring when cosmic rays strike the earth's atmosphere and scatter atomic "debris" in the form of electrons and photons through the air.

When a photon of radiation strikes an electron in the atmosphere, pictures Prof. Jauncey's new theory, the photon loses an enormous amount of energy. To create X particles like those observed by Drs. Street and Stevenson, the photon responsible would have to lose energy amounting to 4,306,000,000 volts.

This vast amount of energy is split two ways, suggests Prof. Jauncey. Of this, 4,240,500,000 volts go into kinetic energy of moving the X particle, and 66,000,000 volts energy goes into increased mass of the X particle. It has previously been found that energy and mass are different forms of the same thing and interchangeable.

The mass energy of an electron at rest, adds Prof. Jauncey, is 500,000 volts which is about one-130th of the mass of the X particle created or, said another way, the X particle has a mass 130 times that of the initial electron.

The point is, states Prof. Jauncey, that the X particle created cannot be expected to have any fixed, exact mass by his theory. Its mass depends on the energy in the initial photon of energy which created it. The higher the photon energy the greater the observed mass of the X particle and there should be, in fact, a whole range of masses for this new particle.

Science News Letter, January 1, 1938

SEISMOLOGY

Mexico's Christmas Quake Centered off Oaxaca Coast

MEXICO City's Christmas Eve earthquake had its epicenter, or point of greatest disturbance, 300 miles away from the city and 60 miles at sea, off the coast of the southern state of Oaxaca, U. S. Coast and Geodetic Survey scientists determined, after examination of data collected telegraphically by Science Service.

The epicenter was in latitute 15.5 degrees north, longitude 99 degrees west. The shock, which the seismologists described as "very strong", occurred at 8:17.9 a. m. eastern standard time, on Dec. 23.

The earthquake shook a large part of the Mexican peninsula and did considerable property damage. The capital itself, however, was little injured due to its situation on a cushioning ancient lake bottom.

Science News Letter, January 1, 1938

IN SCIENCE

PHYSICS

G-Men Help Detect Unidentified Art Treasure

A COPY of "Christ Blessing Bread," a painting by Carlo Dolci, has been identified in the Fine Arts Section of the National Museum with the aid of the Federal Bureau of Investigation.

Not stolen, but unidentifiable was an ancient chromolithograph turned over to the G-men by puzzled Museum experts. On its back was writing which, though perfectly visible, was still too faint to be read with the aid of a magnifying glass.

Infra-red photography, regular weapon of the F. B. I. investigators in battling crime, was resorted to. Infra-red filters and special photographic plates enabled the G-men to turn over to the Museum officials perfectly clear copies of the writing. The Museum then was able to identify its piece as a rare chromolithograph made directly upon canvas, a method popular between 1870 and 1880.

Science News Letter, January 1, 1938

GEOLOGY

One-Third of U. S. Found To be Ill-Watered

ADD to the one-third of the people who are ill-fed, ill-clothed, ill-housed:

One-third of all the land in the United States is ill-watered.

John C. Page, U. S. Commissioner of Reclamation, pointed this out in an address. From the hundredth meridian westward to the crest of the sea-facing mountains on the Pacific slope, average rainfall cannot support the same kind of farming that is familiar in the moister East. Hence, following the lead of the early Spanish missionaries and the earlier Indians, present-day Americans in the region practice irrigation.

The lands now under irrigation, and to be opened to irrigation in the future, do not offset in area more than a tenth of the acreage devastated and still menaced by erosion, declared Mr. Page. Even now, many farmers dispossessed of their holdings by water and wind erosion are being accommodated on irrigated land in the West.

Science News Letter, January 1, 1938

CE FIELDS

ENGINEERING

Lightning Protection Code Issued by Standards Bureau

NINE-TENTHS of the property damage caused by lightning occurs in rural areas, it is reported in the first sections of the Code for Protection Against Lightning, issued by the National Bureau of Standards.

Four hundred people on an average are killed each year in the United States by electric bolts from the sky, the handbook, which details methods of protecting buildings and other property from lightning, reports.

Proper use of lightning rods sharply cuts damage to buildings struck by lightning, it is asserted on the basis of tables printed in the pamphlet. Users of lightning rods are cautioned to see that they are properly connected to the ground, or else they will not perform their function adequately.

Placing lightning rods on small buildings in urban areas, particularly near large buildings, is uneconomical because of the protection afforded by the larger structures, it is stated. Large buildings should always, however, be rodded.

Persons caught out in the open during an electrical storm are advised to seek shelter in as large a building as possible. Failing that, they should head for the shelter of a cliff or of a dense forest. The code was prepared under the joint sponsorship of the American Institute of Electrical Engineers and the National Bureau of Standards and has been approved by the American Standards Association.

Science News Letter, January 1, 1938

ECOLOGY

Ecological Method Applied To Problems of Human Life

ECOLOGY is customarily defined as the study of the relations of plants and animals to their environment and to each other. This definition omits consideration of human relationships. H. G. Wells has extended it, by declaring that economics and sociology are only branches of ecology.

Comes now a scientist who is an ecologist in his own right, and makes direct application of the basic ideas of ecology to problems of human society, as lived in the modern civilized world. (THIS IS OUR WORLD—Paul B. Sears—*Univ. of Oklahoma,* 288 p., $2.50.)

Prof. Sears explains compactly what ecology is, as it works in the subhuman world. Then he shows how civilization on the whole operates as "a disease of the environment." Man strips forests, rips up age-old grasslands, reaps the consequences in dust-storms, floods, and famines. His tools and technique have outstripped the evolution of his intelligence, so there's the very devil to pay.

Yet Prof. Sears is no mere Jeremiah, prophesying only inescapable doom. Ways out can be found by serious application of the community will. Authority is more efficient, but democracy surer in the long run, he thinks.

The duty of the leader in a democracy "is to inform, primarily. He must keep his people aware of the problems which confront them and upon whose existence all sane people of any political leaning can agree. . . . Then, by the decision of his people, fully informed, he must have the courage, and his followers to stand or fall."

Through such courageously democratic means, Prof. Sears believes, human society can achieve a stable culture pattern, comparable to the stability that slowly develops in organic communities in the subhuman world.

Science News Letter, January 1, 1938

ENGINEERING

Higher Test Fuels Promise Economies in Aviation

GREATER fuel economy, more power to enable bigger giants of the air to take off from America's relatively restricted airports, and smaller engines are the promise of high test fuels which will come into use in the near future. Gasolines with anti-knock ratings in excess of 100, when turned to by the aviation industry as the answer to present airplane limitations, will result in more power being derived from less fuel burned in less engine, S. D. Heron of the Ethyl Gasoline Corporation, told the American Petroleum Institute.

"Isoparaffins of higher anti-knock value than iso-octane are known. One of these at least appears to be in all respects a desirable aircraft fuel and to be not impossible of commercial synthesis," he stated.

Science News Letter, January 1, 1938

MEDICINE

Women Warned of Danger From Combs Used for Waves

WHAT starts out to be a ravishing water wave may easily turn into a ravaging fire. From the fire women emerge with burned hair and flesh.

Six cases of dreadful burns from ignition of celluloid combs are reported in the *Journal of the American Medical Association* as a warning to women who seek a beautiful coiffure by the popular water-wave method.

Dr. Howard Fox, well known dermatologist of New York City, describes the painful disfigurements of scalp, face and body that have come to his attention during the last few years.

In only one of six cases reported in detail did the accident occur in a beauty parlor; the others were home accidents.

Sources of heat used for drying were an electric lamp, a gas heater or a stove.

One woman, who is permanently bald over a large area of the scalp and has slowly healing burns on the forehead, hand and knee, thought she was using hard rubber combs. However, they burned suddenly in an explosive manner under a heat lamp. Investigation proved that the combs were made of celluloid.

The other women whose injuries required from a few weeks to a full year to heal and who are bald over areas of various sizes did not realize they were playing with fire when they put celluloid combs in their hair and sat near an electric lamp or stove.

Says Dr. Fox: "Celluloid combs burn almost instantaneously and noiselessly and set fire to the hair before the victim realizes what has happened."

Science News Letter, January 1, 1938

OPTICS

Range Finder Made For Those With Eye Defects

THE miniature camera enthusiast with defective eyesight can now secure a miniature camera equipped to take a correcting lens as a part of its range-finder.

Contax cameras, among the leaders in the present miniature camera field, can be secured with a ring into which the photographer inserts a special lens made to his prescription by his oculist, the Carl Zeiss concern has announced. The lens itself cannot be supplied with the camera as a different one is required by each individual, as is the case with ordinary spectacles.

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PUBLIC HEALTH

1938 Will Be Healthy With Probably No Major Epidemics

By DR. LOUIS I. DUBLIN

Third Vice-President and Statistician, Metropolitan Life Insurance Company

NINETEEN thirty seven has again been a remarkably good health year. The prediction I made for Science Service a year ago has been more than fulfilled.

At the very beginning of the year, to be sure, it seemed that my optimism had been ill-founded. An unseasonably warm January was marked by an unusually high mortality rate. Among the 17,500,000 people who are Industrial policyholders in the Metropolitan Life Insurance Company, for example, the January death rate was more than 10 per cent. higher than during the corresponding month of 1936. Later on, reports for the general populations of a number of States and cities showed that the year had gotten off to a decidedly bad start in various parts of the country.

Influenza Epidemic

The chief cause of the increased mortality was a widespread outbreak of influenza; and this was accompanied by a high incidence of fatal pneumonia and by increased mortality from most of the chronic diseases. This condition practically always accompanies influenza epidemics; many chronically sick persons die prematurely because they are unable to withstand an attack of influenza.

In February, too, the mortality picture was unfavorable; but in March there were signs of a turn for the better. Reports from the flood areas of the Ohio and Mississippi valleys showed that the aftermath of the floods had not been as bad as we had all feared, and that the magnitude of the death toll chargeable to flood conditions had been wildly over-estimated. Indeed, one of the brightest spots in the health record of 1937 is the efficiency which was shown by national, State, and city health officials in coping not only with the immediate emergencies but with the serious potentialities arising from the worst flood in the history of the Ohio and Mississippi valleys.

In April there came a distinct turn for the better, and there followed, beginning with May and extending through seven successive months, a continuous series of all-time low monthly death rates among the millions of Metropolitan policyholders. The crowning distinction, however, goes to the month of September, when the death rate was *the lowest ever recorded for any single month* in the history of this large cross-section of the population.

I hope my readers will understand why I must fall back upon our insurance mortality figures as a gauge of the current health situation. It is because complete and accurate statistics pertaining to the general population of the United States are not yet available—and will not be for some time to come. Such fragmentary information as we have been able to gather for the population at large (and it comes from all parts of the country) points, however, to a lower nation-wide death rate this year than last. Some sections have fared better than others and in some parts of the United States there appears to have been higher mortality in 1937 than in 1936. But, all in all, 1937 is a good example of what has happened several times in the past, namely, that despite a bad beginning, a year may close with an excellent health record.

Record Called Favorable

Aside from the influenza epidemic of last winter and a serious outbreak of poliomyelitis (particularly in the States bordering the Mississippi River and the Great Lakes), the 1937 record for the principal controllable diseases has been distinctly favorable. It is true that more deaths have occurred from whooping cough this year than last, and that during the final quarter the mortality from diphtheria has increased somewhat; but the mortality rate for each of these diseases is still at a low figure and gives as yet no serious concern.

I said a year ago that the mortality from tuberculosis might not continue to show as high a rate of improvement as had obtained for a decade past. Up to the end of May it looked as if there would be no improvement at all, but since then the outlook has brightened and a new low death rate, showing a considerable drop (perhaps as much as 4 per cent.) from that of 1936, is now assured.

The most favorable development of all, in 1937, has been another pronounced drop in the mortality from diseases associated with pregnancy and childbirth. The 1937 figure will mark a drop of approximately 50 per cent., as compared with that recorded only ten years ago. It is true that the birth rate has declined and fewer women have been subject to the hazards of pregnancy and childbirth. That, in itself, would reduce the puerperal death rate. But it is also true that the decline in deaths arising out of pregnancy and childbirth has exceeded the drop in the birth rate. Accordingly, there can be no doubt that there has been a genuine decrease in the hazards of maternity.

Syphilis to Show Decline

Lower rates in 1937 than in 1936, I believe, will be in evidence at the end of the year for most of the principal degenerative diseases, and for syphilis.

There are very few bad spots in the 1937 health record. More deaths from coronary artery diseases were reported than in the immediately preceding year, and the death rate from this cause has again shown a sharp rise. This repeats the experience observed in each successive year since 1930. Part of this increase is fictitious and is due to increasingly accurate diagnosis of coronary conditions; nevertheless, there can be no doubt that an actual increase has occurred in the mortality from these diseases. The cancer death rate is up slightly. It dropped a bit in 1936, but the decline then observed now appears to have been a temporary deviation from the practically continuous upward tendency observed over a long period of years. The reader will understand that most of the deaths from cancer occur in the upper age ranges of life; and with the average age of the population increasing (as it has been doing and will continue to do) an increasing proportion of the population is comprised within the ages where cancer is one of the major causes of death. When we are able to adjust the 1937 cancer death rate to take this age factor into account, we may find that there was no real increase at all. However that may be, it is quite certain that the cancer death rate *is not decreasing;* that cancer ranks second in numerical importance among all the causes of death, and that today the largest opportunity in the entire field of public health lies in the control of cancer.

Another unfavorable item in the 1937 health picture was a marked increase in the prevalence of smallpox in certain states. It is a shameful fact that despite the ease with which this disease can be controlled, the number of cases has steadily increased in this country since 1934, and it is now certain that the total number of cases this year will be more than double the figure for three years ago. It is very fortunate, indeed, that most of the smallpox which has prevailed has not been of the virulent type and that, consequently, the case-fatality rate for this disease has remained low.

The accident situation in general improved somewhat during 1937, although the number of deaths from occupational accidents and automobile accidents has shown an increase. These increases, however, have been more than offset by the decline in fatal accidents in the home.

More Influenza Unlikely

At this writing, the general public health outlook for 1938 appears favorable. We must, of course, always reckon with weather conditions and no one can foretell what they will be during 1938. The health services and the social agencies were never more alert than now, and I believe they will be given all possible encouragement and support. That will make for less sickness and fewer deaths, unless, of course, we meet with an unforseen epidemic. No one can ever be certain about this contingency. A severe epidemic of influenza, for example, would result in many thousands of deaths and an increased general mortality rate. We are not likely to have an important influenza outbreak in 1938, however. We had one early in 1937 and it does not often happen that this disease obtains epidemic prevalence two years in succession. There is, in my judgment, little likelihood of a major outbreak of any of the other communicable diseases.

Tuberculosis To Decline

I believe that tuberculosis will continue to register a declining mortality, and that the unremitting campaign which is being waged against the diseases of pregnant and parturient women will show continued progress and will result, also, in a lowered infant mortality rate.

Please understand that there is no guarantee in these predictions, but I am, as I was a year ago, very optimistic about the outlook for the health of the American people. We are learning every day how to profit from the increased knowledge coming from the scientific medical laboratories; our official agencies are becoming more skilled and are supplied with more resources; our press is cooperating more actively in the campaigns for better health. Altogether, the outlook continues to be extremely promising for longer and healthier living for Americans.

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From Page 7

son. Usually the female goes away to a wild and secluded place, there to have her litter of six or eight pups. She is crabbed and suspicious at that time and will not permit any male dogs around her. For she knows that the male husky will eat her pups if he gets a chance. In winter, the Eskimos build a small snow kennel for the mother dog, place bags or skins on the floor and make the animal as comfortable as possible.

Science News Letter, January 1, 1938

Sixty British scientists have formed a society to study snow and ice.

Even smaller towns of Britain had theaters in the time of Roman conquest.

NEARLY PURE BRED

This grayish-white dog, which can pull its own weight in sled and supplies, is typical of the thousands of nearly pure-bred huskies in the Far North. Indiscriminate cross-breeding has, however, made large inroads in the purity of the breed.

PHYSIOLOGY

Bulldog's Build, Behavior Due to Glandular Defects

THE bulldog's peculiar head, body build and behavior, including the occasional devouring of bulldog puppies by their mother, have been traced to defects of thyroid and pituitary glands in research reported by Dr. Charles R. Stockard of Cornell University Medical College to the American Association for the Advancement of Science.

These gland defects in the bulldogs, and other gland defects or disorders in other breeds of dogs, are inherited and are associated with changes in the animals' instinctive behavior.

Dogs like the St. Bernard and the bloodhound have inherited pituitary gland defects which are responsible for their peculiar build. Humans with this particular gland defect grow into giants with lantern jaws and huge hands and feet.

Clumsy Mothers

In the giant dogs, the maternal instinct is undeveloped. The mothers ignore their puppies and have to be taught to lick and clean their young. All the puppies in the litter may be crushed to death within a few days because of two other defects in maternal behavior. These are failure of the "push reflex" and of a reflex for limp bending of wrist and ankle. The "push reflex" is shown by the normal bitch when she lies down beside her puppies, carefully letting her body slide down and pushing the puppies away so as to avoid mashing them. The wrist and ankle reflex serves to push the puppies aside as the foot of the mother descends to the floor of the nest when she returns to her puppies.

Feeding magnesium salts to the mothers, Dr. Stockard reported, was partially successful in overcoming the failure of proper maternal behavior, but the fault was in the glands, not the diet.

The change in a normal dog from a frolicsome puppy to a sedate and dignified grown-up dog and the dog's devotion to his master are also governed by gland changes. Before the dog has matured he is equally attracted by any friendly person but after he has gone through certain normal gland changes he develops his strong devotion to his master. These gland-linked behavior changes are characteristic of all dogs but are more emphasized in breeds like the bull that have abnormal glands.

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ASTRONOMY

Good Eclipse Year

Four Due in 1938, Two of Sun and Two of the Moon, The Latter Total and Visible in United States

By JAMES STOKLEY

THE new year is rather well provided in the matter of eclipses, for four occur, two of the moon and two of the sun. Both lunar eclipses are total, and both are visible, partly at least, in the United States. One of the solar eclipses is total, the other partial, but neither will be seen from this country.

The first is during the night of May 13, that is, in the early morning of the 14th. At that time the moon will be obscured when it enters the shadow of the earth. All the United States will see the beginning, but the moon will have set in the eastern half before the final stages are reached. However, it will still be above the horizon for the western section, and the people in this region will see the end as well. This will be the first total eclipse of the moon easily visible in this country since July, 1935, and it will be well observed.

Earth Causes Red Color

An eclipse of the moon is rather striking. Even though it is not of very great scientific importance, it is impressive to see the moon gradually covered by the curved terrestrial shadow, according to schedule. The red color which the moon assumes during an eclipse, due to sunlight reddened in passing through the atmosphere of the earth, is quite startling, and one can imagine the effect that it had upon the mind of primitive man.

November brings the second eclipse visible here, again total, and of the moon. This time the end of the eclipse will be seen in all parts of the United States except the extreme west. In Europe the whole eclipse will be visible.

Though persons in the east of the country will not see the whole eclipse, they will have one very strange experience, that of seeing the totally eclipsed moon and the sun in the sky at once. That is, the total eclipse commences before the moon rises, and moonrise occurs several minutes before sunset!

At first glance this seems to be impossible. In order for the moon to be in the earth's shadow, the three bodies, earth, moon and sun, must be in line. Therefore, one might well suppose, the moon could not come up until the sun was going down. However, the atmosphere of the earth produces an effect known as refraction. This bends light rays, as in a prism, and makes an object appear a little higher in the sky than it actually is.

The effect is greatest near the horizon, where the light passes through the greatest depth of air. On the horizon the moon is raised its own diameter, and the sun is also, so that the two can be seen above the horizon though one is actually below.

Eclipse Over Ocean

The total eclipse of the sun, on May 29, will not be visible in any part of North America. Then the moon's shadow will pass across the south Atlantic Ocean, over the South Orkney, the South Georgia and the Sandwich Islands. In the best part of this path, which is in the ocean, the sun will be hidden for 4.3 minutes, which is quite long. However, the sun will then be very low in the sky, the region of visibility is not very accessible, and the chances of bad weather are considerable, so the eclipse will not attract many expeditions from other parts of the world. Perhaps some of the South African astronomers, who are nearest, may be able to make a trip and take advantage of good conditions, if they should happen to prevail.

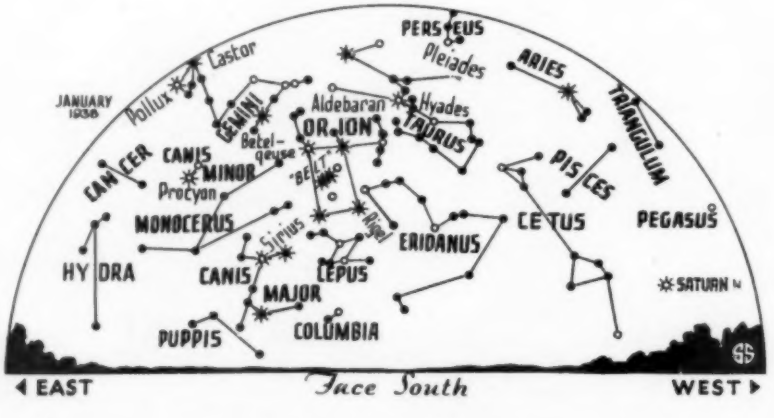
This eclipse is of interest, however, in being the first total one in a series that will have others that are remarkably favorable. An eclipse of the sun repeats itself after a period of 18 years, 10 or 11 days, called a Saros. When this one occurred last, on May 17, 1920, it was only partial and the dark part of the moon's shadow failed to reach the earth. Then it was visible as a partial eclipse in the Indian Ocean, southwest of Australia.

Good Eclipse in 1956

When it comes again, June 8, 1956, it will again be total, the path will cross the Pacific Ocean, farther north than this year, and the duration will be even longer. Thus it will build up, until finally it will last almost as long as the record breaking eclipse of last June 8.

The year's last eclipse is a partial one of the sun, on November 21, visible over a larger section of the northern Pacific Ocean, the west coast of North America and the east coast of Asia.

Both the summers of 1936 and 1937 were favored with naked-eye comets. There is no way of telling whether 1938 will be as fortunate, though there is the possibility that one may come, unheralded, that will rival in brilliance the famous comets of the past. Of the periodic comets whose return is expected this year, the list is very meager. Gale's comet, which was found by an Aus-



ONLY ONE PLANET

Saturn alone is still visible late enough to appear on the evening sky maps.

tralian astronomer in 1927, will make its first return since then and may become bright enough to be seen with binoculars. It should turn up during the first part of the year in the general direction of the constellation of the scorpion. As this is best seen from the southern hemisphere, Mr. Gale, or some of his countrymen, may again pick it up first.

Another comet due back, but which will probably not be seen, is Schorr's, found in 1918 by a German astronomer. It has supposedly returned twice since then but has been observed on neither occasion. The return of Kopff's comet, which happens every 6.56 years, is also expected, but this is not a favorable one. However, it has been seen four times already, its orbit is well determined, and its recovery is not important.

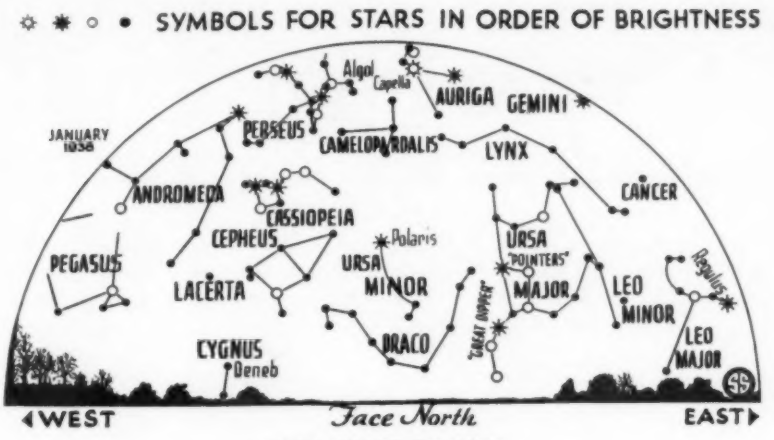
The Planetary Program

As for the planetary program in 1938, Mercury will be seen in the evening sky about July 30 and November 25. Venus will begin to appear in the evening sky about March, and will be farthest east of the sun, and visible longest into the night, September 11. On October 16 it will be at greatest brilliance, then it will quickly approach the sun, and by early November will be out of sight. Jupiter will appear as a morning star, before sunrise, during the spring and early summer, after which it will be seen during evening hours, in the constellation of Aquarius. It is gradually approaching Saturn, which is a little farther east, in the constellation of Pisces. Saturn will be visible in the evening sky at the beginning of the year. In the summer it will appear as a morning star, while in the autumn it will appear in the evening again.

Jupiter in Line With Sun

January brings to a close the appearance in the evening skies of the three planets that were so prominent only a few months ago. Jupiter is almost in line with the sun, and cannot be seen either morning or evening. Mars is still visible low in the west soon after sunset, but is so near the horizon that it does not show on the maps. Saturn appears a little higher, and is the only one indicated.

These maps reveal the aspect of the skies at 10:00 p. m., January 1, 9:00 p. m. on the 15th and 8:00 p. m. on the 31st. Even the early morning skies are devoid of their planetary decorations, for Venus, which has been the brilliant morning star, is also coming into line with the sun and is no longer visible. For a day or two, about January 20, however, Mercury will be seen in the east in the morning twilight.



THE SWAN LEAVES

Deneb, low in the northwest, is all that remain visible of the constellation Cygnus. But the glorious constellations of winter evenings are now shining high above.

But despite the poor showing of the planets, this month does reveal the glorious constellations of a winter evening. Orion is high in the south, the three stars in a row representing the belt of this great warrior. Betelgeuse, above, is one of his shoulders, and Rigel, below, one of his legs. Below, and to the left, is Sirius, most brilliant star in the nighttime sky, and one of the closest. This is the so-called "dog-star," part of Canis Major, the great dog. A little higher, and farther east, is Procyon, in Canis Minor, the lesser dog. Still higher are the twins, Castor and Pollux, of the constellation of Gemini. Pollux is slightly brighter than his brother.

Creamy-White Capella

Directly overhead is creamy-white Capella, in Auriga, the charioteer. As we follow around still farther, we find high in the south, to the right of Orion, the group of Taurus, the bull. Aldebaran, a star that is distinctly red in color, forms an eye of the animal. This is in a V-shaped group of stars, the Hyades, which outline the face. Farther over, in the shoulder, is a little cluster of stars, six of which can be seen with the normal eye, called the Pleiades, the "seven sisters" of mythology.

To the northeast, the great dipper, part of Ursa Major, the great bear, is swinging around into a higher position than it held during the late autumn, and the handle points downwards. The top two stars are the pointers, which show the direction of the pole star, Polaris, to the left. On the opposite side of Polaris is the figure of Cassiopeia, shaped like a W on its side.

Just north of the east point, the "sickle," in Leo, the Lion, with brilliant Regulus at the end of the handle, is making an appearance. Very low in the northwest, where it is rather difficult to find, is Deneb, another first magnitude star, all that now remains visible of Cygnus, the swan.

The moon is nearest the earth on January 14, 9:00 p. m., 222,850 miles; farthest January 27, 1:00 p. m., 252,200 miles.

Phases of the Moon

		E.S.T.
New	Jan. 1	1:58 p.m.
First Quarter	Jan. 9	9:13 a.m.
Full	Jan. 16	12:53 a.m.
Last Quarter	Jan. 23	3:09 a.m.
New	Jan. 31	8:35 a.m.

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GEOLOGY

Expedition To Seek Age Of the Panama Isthmus

SEEKING the birthdate of the Isthmus of Panama, which may have been as much as 20,000,000 years ago, two University of Chicago geologists, Drs. Paul C. Miller and Paul O. McGrew, are enroute to the province of Gracias, Honduras, where they hope to unearth the desired evidence.

Digging in the tertiary strata of the isthmus, these two geologists, who will later be joined by Everett C. Olsen, a student of fossils, hope to determine just when South American animals were able to walk to North America. Once, before the isthmus existed, this was not possible. If the fossil remains of South American animals can be found and dated in Honduras, the birthdate of the isthmus can be determined.

Science News Letter, January 1, 1938

PHYSICS—PHYSIOLOGY

Aid Study of Thin Films Important in Lubrication

NEW experiments, that are the outgrowth of the research for which the 1937 Nobel Prize in Physics was awarded, were revealed to have important significance for industry in studying the little-known but vital facts of lubrication.

In a report to the meeting of the American Physical Society in Indianapolis, Dr. L. H. Germer of the Bell Telephone Laboratories, New York City, described his researches on the nature of very thin films only a single molecule thick.

Dr. Germer was the colleague of Dr. C. J. Davisson in the epoch-making experiments on the diffraction of electrons for which Dr. Davisson — jointly with Prof. G. P. Thomson of England—was awarded the 1937 Nobel Prize.

Dr. Germer's current work, reported jointly with K. H. Storks, describes the bombardment of films of stearic acid with swift electrons and an analysis of the resulting diffraction patterns.

When a number of molecular layers of this acid were placed on a metal surface it was found that the long molecules were inclined at an angle. Significant, however, was the finding that the first layer of these molecules stood up at straight right angles to the plane of the metal surface even though subsequent layers were inclined.

"These experiments," said Dr. Germer, "seem to us to be significant in two ways; in the first place, they reveal the arrangement and structure of organic molecules upon surfaces, in the second place, we believe that they reveal chemical combination between a surface and the first layer of acid molecules. These particular results have interesting bearing upon theories of lubrication, in particular the nature of 'oiliness' and boundary lubrication."

The current Nobel awards to Dr. Davisson and Prof. Thomson were made for electron diffraction experiments which showed, at first, only matters of theoretical significance; that material particles of matter (the electrons) could exhibit the properties associated with waves under the proper conditions.

The experiments of Drs. Davisson and Germer, and of Prof. Thomson, were made independently and formed the clinching evidence on which is built up the new theory of wave mechanics that is now used widely to interpret the structure and behavior of matter. It is a tribute to the breadth of these researches that potential commercial applications of the work are now becoming apparent.

New facts about the performances of very thin layers of substances were revealed by Dr. Irving Langmuir, Nobelist and General Electric chemist, when he told of his latest experiments with one-molecule-thick layers.

Finding that films stand on their heads, as it were, with great ease, he has devised a way of "conditioning" the surface upon which they are captured so as to anchor them. A film laid on water and transferred to a plate dipped into it should wear its hydrophilic or water-loving side outside, while a layer picked up by a plate raised to the surface through the water should have its hydrophobic or water-fearing side up.

Dr. Langmuir reasoned that such films should have different properties promising interesting uses in research. But many monolayers were able to turn over and exchange their hydrophilic and hydrophobic parts. So Dr. Langmuir by devising ways of anchoring the layers has made films of a single substance that have a wide range of properties.

The inner surface areas of the human and animal body are the battleground of disease toxins and antitoxins, declared Dr. Harry Sobotka, chief chemist of Mount Sinai Hospital, New York.

"Most people know their height in inches or their weight in pounds," said Dr. Sobotka, "but nobody bothers with measuring his or her surface area." Yet these areas—in the lungs, the stomach, the intestine, and even the surface area of the red corpuscles in the blood—are vital to living.

New knowledge of chemistry, gleaned from such "thin film" researches as those of Dr. Irving Langmuir, has important bearing on the role played by the enzymes, vitamins, hormones and toxins and antitoxins, declared Dr. Sobotka.

Few people realize, he indicated, that the surface area of the human lungs is nearly 2,000 square feet; or that the intestines contain a total area of nearly 50 square feet; or that the area of the red corpuscles in the blood stream of the body have an area equal to nearly three-quarters of an acre!

The role of viruses, hormones and enzymes, he added, rests on their ability to distribute themselves over large surfaces in very thin films which may be only a molecule or two in thickness. Thus tiny amounts of these crucial chemicals affect tremendous surface areas in the body.

Science News Letter, January 1, 1938

A child should have all 20 of its temporary teeth by the time it is two and one-half years old.

Books

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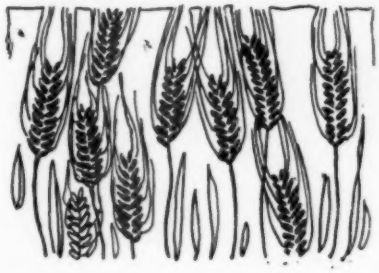
GEOGRAPHY

NATURE RAMBLINGS
by Frank Thone



Lack o' Land

CROWDED peoples press distracted rulers into national policies that offer no hope for solution of their problems. The two measures most favored in recent times, conquest and encouragement of migration, are illusory hopes, declares Dr. Isaiah Bowman, president of the Johns Hopkins University, in the introduction to a new book. (LIMITS OF LAND SETTLEMENT: A REPORT ON PRESENT-DAY POSSIBILITIES—Isaiah Bowman, ed.—*Council on Foreign Relations,* 380 p., maps, $3.50) Each of the ten chapters is contributed by an acknowledged authority in the field of human geography.

"One conclusion stands out above the rest," Dr. Bowman sums up: "New land will accommodate too slow and small a stream of population to be of real social importance to the countries of origin. In our present nationalized world, in which the best lands have been occupied, and restrictive measures are in force, migration is no answer to economic and social strain induced by so-called overpopulation.

"Nor is military conquest either a practical or a rational answer. The struggle for additional territory as a step in empire building can be understood; the hope that it will furnish an offset to a high birth rate is based upon an illusion.

"No discernible or predictable stream of migration can keep pace with the birth rates of conspicuously overcrowded countries."

Those who still do go a-pioneering have to be helped along by their respective home governments. By one school of thought, says Dr. Bowman, this is taken to mean that the old pioneering spirit is gone and that the present generation of would-be settlers is "soft."

But this philosophy, he answers, may be said to ignore the fact that "things were never as they used to be." In our own land, the Lords Proprietor in colonial days, and the special concessions to canals and railroads later, were early manifestations of the same "colonist coddling." It is only reasonable to expect that inducements must be held out to prospective pioneers, as offsets to the hardships they know they will have to endure.

Science News Letter, January 1, 1938

●RADIO

January 6, 4:00 p. m., E.S.T.

WORLD WIDE WEATHER—Dr. W. R. Gregg, Chief of the U. S. Weather Bureau.

January 13, 4:00 p. m., E.S.T.

SAVING MINDS WITH INSULIN—Dr. Z. M. Lebensohn, St. Elizabeth's Hospital.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

PLANT PHYSIOLOGY

Holly Berries Made to Grow Without Pollination

HOLLY berries, bright and red, have been caused to grow without the usually necessary pollen, by spraying the unfertilized flowers with growth-promoting chemicals.

Experiments in which this was accomplished will be reported in a few days by Dr. F. E. Gardner of the U. S. Department of Agriculture and Prof. E. J. Kraus of the University of Chicago (*Botanical Gazette*).

Holly trees, unlike many familiar plants, are of two distinct sexes. Female or fruit-forming flowers are borne on one tree, male or pollen-producing flowers on another. If there is no male tree in the neighborhood of the female trees the latter cannot produce berries; they blossom, but the flowers come to nothing.

Drs. Gardner and Kraus found they could cause the formation of fruits from unpollinated female flowers by spraying with any one of several of the chemicals recently found to be growth promoters in plants. The result could be obtained with very dilute solutions; a 0.04 per cent. solution of indole-acetic acid proved effective.

The berries grew to normal size and ripened to their red color in the autumn. However, they contained no seeds.

In response to a query by Science Service, Dr. Gardner stated that while the process would be entirely practicable for the sure production of good crops of holly berries, it is not economic on a large scale at present because of the high cost of the chemicals. They are marketed at present at prices ranging from $60 to $90 an ounce.

However, Dr. Gardner added, there is no reason why the growth-promoting spray technique might not be used for treating special individual specimens of holly, where sure results count more than cost.

Thus, a florist might have small potted holly plants which he would want to be heavily in fruit when he offered them for sale. Or a property owner with a few holly bushes in prominent positions in his shrubbery might be willing to spend a dollar or two apiece on them to make sure they would produce the sharp red-and-green note wanted at Christmas.

Science News Letter, January 1, 1938

METEOROLOGY

Two Early Presidents Were Meteorologists

THOMAS Jefferson, third president of the United States, and James Madison, fourth president, were among Virginia's earliest meteorologists, Prof. E. Ray Casto of Emory and Henry College reveals in his new book, "The Climatology of the Virginians."

Jefferson at Monticello and Madison at Williamsburg made contemporary observations. "By their careful records and deductions," Prof. Casto reveals, "(they) showed the value of the making of simultaneous observations, that great underlying principle of all modern weather bureaus."

Science News Letter, January 1, 1938

Nearly all varieties of domestic duck trace ancestry to the mallard, the "wild duck of the world."

Two kinds of ants new to science have been discovered in the Great Smoky Mountains by a Tennessee scientist.

•First Glances at New Books

Comparative Anatomy

THE DEVELOPMENT OF THE VERTEBRATE SKULL—G. R. de Beer—*Oxford Univ. Press,* 552 p., 143 plates, $10. A massive, thoroughly complete and detailed discussion of the development of a number of types of vertebrate skulls, from *Polypterus* to *Homo.* The author dedicates it "to the memory of Thomas Henry Huxley, William Kitchen Parker, Ernst Gaupp, Jan Willem van Wijhe, as a monument to their labours in the study of the development of the vertebrate skull;" it is a monument no less to the patience and scholarship of the author himself. Its publication automatically makes this book a necessity for every department of zoology where comparative anatomy is taught.

Science News Letter, January 1, 1938

Anthropology

PRIMITIVE RELIGION — Paul Radin — *Viking,* 322 p., $3.50. Savages are human personalities, and their religion is intimately embedded in their lives and economic problems, Dr. Radin reminds us in this humanistic account of primitive man's religious life. His explanations, with many incidents from tribal life, stress two types of individual who play major roles in religion, shaping and disrupting it.

Science News Letter, January 1, 1938

Archaeology, Juvenile

THE GIFT OF THE RIVER—Enid LaMonte Meadowcroft—*Crowell,* 235 p., $2. A teacher, interested in the colorful, human story of ancient Egypt, has written a history of the Egyptians for children. Following the present trend in history books, this one stresses social history and changes in custom and invention, more than the dynasties of kings.

Science News Letter, January 1, 1938

Language

THE ROMANCE OF THE ALPHABET—Arthur B. Allen—*Warne,* 126 p., $1.50. A pleasantly written little book, by an author who finds the alphabet a really lively and worth-while subject to explore, and who succeeds in making readers share his enthusiasm. It is one of the British "Teachers' Handy Information Books."

Science News Letter, January 1, 1938

Geography

EAST OF THE GREAT GLACIER—Helge Ingstad—Knopf, 268 p., illus., $3. A strange modern chapter in world colonization is told by this Norwegian who was commissioned by his government in 1931 to establish a base in East Greenland to test the Danish claim to that region. The venture failed politically. But the pioneer's experiences make a record of great interest.

Science News Letter, January 1, 1938

Anthropology

EARLY MAN: AS DEPICTED BY LEADING AUTHORITIES AT THE INTERNATIONAL SYMPOSIUM, THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, MARCH, 1937—George Grant MacCurdy, ed.—*Lippincott,* 362 p., illus., $5. Here is the imposing array of papers read by 36 foreign and American scientists at their recent meeting for discussing together the problems of man's past. These papers show how the geologist, botanist, and many other types of expert are being drawn into the task of re-discovering human pre-history.

Science News Letter, January 1, 1938

Documentation

BOOKS & DOCUMENTS: DATING, PERMANENCE AND PRESERVATION — Julius Grant—*Chemical Publishing Co. of N. Y.,* 218 p., illus., $4.50. Librarians and collectors will be especially interested in the discussion of how to tell how old is a book or document, while publishers, printers and those commercially interested in printing are concerned with the discussion of permanence and preservation.

Science News Letter, January 1, 1938

Natural History

SWIFT MOVEMENTS IN THE TREES AND AT THEIR ROOTS — Phyllis Kelway — *Longmans,* 189 p., illus., $2.50. Small English animals — squirrels, shrews, toads—briskly photographed and casually chatted about. A really charming book.

Science News Letter, January 1, 1938

Ethnology

A HISTORICAL, POLITICAL, AND NATURAL DESCRIPTION OF CALIFORNIA BY PEDRO FAGES, SOLDIER OF SPAIN—translated by Herbert Ingram Priestley—*Univ. of California press,* 85 p., $1.50. In this translated version, one of the earliest descriptions of California becomes available to a wider circle of readers. Fages' manuscript, a report to the Viceroy in 1775, has already won appreciation from ethnologists for its valuable observations on Indians of California.

Science News Letter, January 1, 1938

Natural History

KOALA MAGAZINE — *Koala Club of Australia,* 32 p., quarterly, $2. per year, for club membership and subscription. Address: Frank L. Edwards, The Koala Club of Australia, Twyford House, 17 Castlereagh St., Sydney, Australia. Dedicated primarily to promoting the interests of Australia's delightful little "native bear" or Koala, now sorely menaced with extinction, this new magazine also includes within its scope questions concerning Australian wildlife generally. One is left with the decided impression that in many ways North America and the Southern Continent have much in common, and that alert minds in both regions are thinking along much the same lines.

Science News Letter, January 1, 1938

Expositions

NEW YORK WORLD'S FAIR, 1939—Frank Monaghan—*Encyclopedia Britannica,* 48 p., illus., 50 c. Backgrounded by historical and pictorial accounts of great fairs of the past, this is an informative preview of the spectacle now evolving in Flushing Meadow.

Science News Letter, January 1, 1938

Photography

PHOTOGRAPHIC HINTS & GADGETS—Frank R. Fraprie and Franklin I. Jordan, eds.—*American Photographic Publishing Co.,* 316 p., illus., $3.50. Methods of solving many troublesome photographic problems are described in this amply-illustrated book by the men who solved the problems. Valuable to the advanced amateur or professional photographer.

Science News Letter, January 1, 1938

Geography

THE GEOGRAPHY OF EUROPE—George D. Hubbard—*Appleton-Century,* 876 p., illus., $5. Man versus his environment is the great theme of this very comprehensive college text. It not only includes present economic, climatic, and population factors, but also shows how events of the past have shaped conditions as they are today.

Science News Letter, January 1, 1938

Physics

EXPERIMENTAL PHYSICS—Samuel Robinson Williams—*Ginn,* 158 p., $1. Fifty-two experiments in elementary college physics as developed at Amherst College.

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